

# **EXHIBIT S**

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19 Attorneys for Plaintiffs  
20 And All Others Similarly Situated

21 UNITED STATES DISTRICT COURT  
22 SOUTHERN DISTRICT OF NEW YORK

23 JOHN NYPL, et al.  
24 Plaintiffs,

25 v.

26 JP MORGAN CHASE & CO., et al.  
27 Defendants.

Case No.: 15 Civ. 9300 (LGS)

**DECLARATION OF CARL S. SABA**

1 I, Carl S. Saba, declare as follows:

2 1. I am a partner in the Forensic and Financial Consulting Services Group at Hemming  
3 Morse, LLP, certified public accountants, and have been engaged by Plaintiffs' counsel as a  
4 consultant in connection with the above-captioned case. I make this Declaration in support of  
5 Plaintiffs' Third and Fourth Amended Complaints. Except as otherwise stated, this Declaration is  
6 based on my personal knowledge and, if called upon to do so, I could and would testify competently  
7 to the facts stated herein.

8  
9 **Assignment and Analysis**

10 1. I have been engaged by the Alioto Law Firm and Law Offices of Lingel H. Winters  
11 ("Counsel") to review data pertaining to spot market fix rates, and analyze whether such fix rates  
12 has any relationship to the rates charged to retail consumers and businesses ("End-users") to  
13 exchange the EUR / USD currency pair directly with the Defendants.

14 2. Counsel has requested that I analyze the quoted exchange rates for the EUR / USD  
15 currency pair offered by Visa and Mastercard to End-users, and their relationship to the spot market  
16 fix rates.

17 3. I compared the exchange rates as quoted online by Visa and Mastercard to End-  
18 users, to the European Central Bank spot market fix rate<sup>1</sup> ("ECB Fix Rate") on the same days. The  
19 data for Visa and Mastercard was obtained from their online currency converter tool, and in  
20 obtaining the rates, I entered a 0% bank fee in order to assess the base exchange rate that they quote  
21 before any transaction charges<sup>2</sup>. The chart appended to this declaration summarizes the Visa and  
22 Mastercard EUR / USD exchange rates as compared to the ECB Fix Rate. It contains daily quotes  
23 from August 1, 2017 through February 21, 2018.

24  
25 <sup>1</sup> As published by the European Central Bank.  
26 [https://www.ecb.europa.eu/stats/policy\\_and\\_exchange\\_rates/euro\\_reference\\_exchange\\_rates/html/i  
ndex.en.html](https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/index.en.html)

27 <sup>2</sup> <https://usa.visa.com/support/consumer/travel-support/exchange-rate-calculator.html>  
28 <https://www.mastercard.us/en-us/consumers/get-support/convert-currency.html>

1           4.       The chart indicates that over the period analyzed, the difference between the Visa  
2 quoted rate and the ECB Fix Rate is less than 1% on the majority of days. Out of 144 days, I noted  
3 that only on 12 days the difference exceeded 1%, and the majority of those days the difference was  
4 between 1-2%. In comparing the Mastercard quoted rate to the ECB Fix Rate, for all 144 days the  
5 difference was less than 1%.

6           5.       Although a direct comparison of the Visa and Mastercard quoted rates to the ECB  
7 Fix Rate demonstrates a strong correlation, I further tested the relationship between the data points  
8 through a linear regression. The linear regression equation applied a formula by which the ECB Fix  
9 Rate is used as an explanatory variable ("X") to predict the Visa or Mastercard End-user rate as  
10 dependent variable ("Y"). I applied this regression to the above data of transactions occurring  
11 between August 1, 2017 and February 21, 2018.

12           6.       The regression I performed indicated a strong fit in how accurately it predicts the  
13 Visa or Mastercard end user rate in relation to the ECB Benchmark Fix Rate. That accuracy is  
14 99.00% or better for all of the 144 days for Visa except for one day. On that one day, the accuracy  
15 of the regression equation is 98.98%. The accuracy of the regression equation is 99.00% or better  
16 for all of the 144 days for Mastercard. The regression analysis demonstrates a direct relationship  
17 between the ECB rates and Visa or Mastercard end user bank rates. One can generally predict  
18 99.00% or more of the end user rate quoted by the credit cards (before any transaction fees) in the  
19 investigation based on entering the ECB rate into the regression formulas. The regression formulas  
20 are  $Y = 0.9768X + 0.0322$  for Visa and  $Y = 1.0175X - 0.0172$  for Mastercard. X represents the  
21 ECB rate and Y represents the predicted credit card end user rate.

22           7.       I reviewed the output of the regression analysis and noted that the R squared was  
23 95.12% for Visa and 99.56% for Mastercard. In a regression analysis, R squared varies between 0%  
24 and 100%, and represents a measure of how well the data fits the regression formula. The R squared  
25 of over 95% for both credit cards indicated a strong fit between the data and the regression line.

26           8.       Additional evidence of a strong fit of the data to the regression line is contained in  
27 the F Probability, which is far less than one percent for both Visa and Mastercard. The F Probability  
28 tests the null hypothesis that all the regression equation coefficients are zero, meaning that there is

1 no relationship between the ECB Fix Rate (X) and the credit card End-user rate (Y). The F  
2 Probability indicates the likelihood that the null hypothesis is true, and generally a probability  
3 below 5% is considered strong evidence that the null hypothesis should be rejected, and that the  
4 regression equation has some validity and predictive power. In the regression equations the  
5 extremely small F Probabilities well below 1% for both Visa and Mastercard, indicate evidence of  
6 predictive power.

7 9. My analysis leads me to conclude that over the 144 days analyzed, there appears to  
8 be a strong correlation between the ECB Fix Rate for the EUR / USD currency pair, and the base  
9 exchange rates quoted by Visa and Mastercard to End-users (before addition of transaction fees).  
10 For the large majority of days, the variance between the End-user rates and the ECB Fix Rate is less  
11 than 1%.

12  
13 I declare under penalty of perjury under the laws of the United States of America that the  
14 foregoing is true and correct.

15  
16 Executed this 28th day of February 2018, at Los Altos, California.

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CARL S. SABA

# Daily Comparison of Exchange rates EURO/USD (Aug 1, 2017 - Feb 21, 2018)

Date	ECB Spot Fix Rate	Visa	Mastercard	% Difference Visa to ECB Fix Spot Rate	% Difference Mastercard to ECB Fix Spot Rate	Regression Predicted Visa Rate	Regression Predicted Mastercard Rate	% Difference Visa Actual Regression to Visa Actual Rate	% Difference Mastercard Regression to Mastercard Actual Rate
2/21/2018	\$ 1.2312	\$ 1.2413	\$ 1.2344	0.82%	0.26%	\$ 1.2348	\$ 1.2356	-0.52%	0.09%
2/20/2018	1.234	1.243576	1.24097	0.78%	0.56%	1.2376	1.2384	-0.48%	-0.21%
2/19/2018	1.241	1.255574	1.243369	1.17%	0.19%	1.2444	1.2455	-0.89%	0.17%
2/16/2018	1.2464	1.251175	1.255187	0.38%	0.70%	1.2497	1.2510	-0.12%	-0.33%
2/15/2018	1.2493	1.246575	1.250939	-0.22%	0.13%	1.2525	1.2540	0.48%	0.24%
2/14/2018	1.2348	1.237176	1.241292	0.19%	0.53%	1.2384	1.2392	0.10%	-0.17%
2/13/2018	1.2333	NA	1.237057	NA	0.30%	1.2369	1.2377	NA	0.05%
2/12/2018	1.2263	1.228777	1.22948	0.20%	0.26%	1.2301	1.2306	0.10%	0.09%
2/9/2018	1.2273	1.229577	1.228668	0.19%	0.11%	1.2310	1.2316	0.12%	0.24%
2/8/2018	1.2252	1.240676	1.229377	1.26%	0.34%	1.2290	1.2294	-0.94%	0.01%
2/7/2018	1.2338	1.243576	1.240182	0.79%	0.52%	1.2374	1.2382	-0.50%	-0.16%
2/6/2018	1.2329	NA	1.243005	NA	0.82%	1.2365	1.2373	NA	-0.46%
2/5/2018	1.244	1.251875	1.247274	0.63%	0.26%	1.2473	1.2486	-0.36%	0.10%
2/2/2018	1.2492	1.252375	1.251586	0.25%	0.19%	1.2524	1.2539	0.00%	0.18%
2/1/2018	1.2459	1.247575	1.248545	0.13%	0.21%	1.2492	1.2505	0.13%	0.16%
1/31/2018	1.2457	1.245475	1.247148	-0.02%	0.12%	1.2490	1.2503	0.28%	0.25%
1/30/2018	1.2421	1.246875	1.245241	0.38%	0.25%	1.2455	1.2466	-0.11%	0.11%
1/29/2018	1.2379	1.249475	1.243199	0.94%	0.43%	1.2414	1.2424	-0.65%	-0.07%
1/26/2018	1.2436	1.253875	1.249178	0.83%	0.45%	1.2470	1.2482	-0.55%	-0.08%
1/25/2018	1.2407	1.241576	1.252996	0.07%	0.99%	1.2441	1.2452	0.21%	-0.62%
1/24/2018	1.2352	1.230677	1.239822	-0.37%	0.37%	1.2388	1.2396	0.66%	-0.02%
1/23/2018	1.2249	1.227477	1.230189	0.21%	0.43%	1.2287	1.2291	0.10%	-0.09%
1/22/2018	1.2239	1.229677	1.226999	0.47%	0.25%	1.2277	1.2281	-0.16%	0.09%
1/19/2018	1.2255	1.226577	1.229158	0.09%	0.30%	1.2293	1.2298	0.22%	0.05%
1/18/2018	1.2235	1.223377	1.226202	0.73%	0.22%	1.2273	1.2277	-0.41%	0.12%
1/17/2018	1.2203	1.228377	1.231888	0.66%	0.95%	1.2242	1.2245	-0.34%	-0.60%
1/16/2018	1.2277	1.229777	1.231888	0.55%	0.73%	1.2268	1.2272	-0.24%	-0.38%
1/15/2018	1.2137	1.221778	1.229384	-0.48%	0.14%	1.2314	1.2320	0.79%	0.21%
1/12/2018	1.205979	1.205979	1.215286	-0.64%	0.13%	1.2178	1.2177	0.98%	0.20%
1/11/2018	1.2017	1.20188	1.205318	0.01%	0.30%	1.2060	1.2055	0.35%	0.02%
1/10/2018	1.1992	1.19768	1.201514	-0.13%	0.19%	1.2036	1.2030	0.49%	0.12%
1/9/2018	1.1932	1.205279	1.197326	1.01%	0.35%	1.1977	1.1969	-0.63%	-0.04%
1/8/2018	1.1973	1.208379	1.205154	0.93%	0.66%	1.2017	1.2011	-0.55%	-0.34%
1/5/2018	1.2045	1.208979	1.2083	0.37%	0.32%	1.2088	1.2084	-0.02%	0.01%
1/4/2018	1.2065	1.206879	1.208658	0.03%	0.20%	1.2107	1.2104	0.32%	0.13%
1/3/2018	1.2023	1.208479	1.206575	0.51%	0.36%	1.2066	1.2061	-0.15%	-0.04%
12/29/2017	1.2065	1.20298	1.20804	-0.29%	0.13%	1.2107	1.2104	0.64%	0.20%
12/28/2017	1.1993	1.19598	1.202191	-0.28%	0.24%	1.2037	1.2031	0.64%	0.07%
12/27/2017	1.1934	1.191081	1.195334	-0.19%	0.16%	1.1979	1.1971	0.57%	0.15%
12/27/2017	1.1895	1.188281	1.190518	-0.10%	0.12%	1.1941	1.1931	0.49%	0.18%
12/22/2017	1.1853	1.189081	1.18731	0.32%	0.17%	1.1900	1.1888	0.08%	0.13%
12/21/2017	1.1859	1.190281	1.188704	0.37%	0.24%	1.1906	1.1895	0.03%	0.06%

# Daily Comparison of Exchange rates EURO/USD (Aug 1, 2017 - Feb 21, 2018)

Date	ECB Spot Fix Rate	Visa	Mastercard	% Difference Visa to ECB Fix Spot Rate	% Difference Mastercard to ECB Fix Spot Rate	Regression Predicted Visa Rate	Regression Predicted Mastercard Rate	% Difference Visa Regression to Visa Actual Rate	% Difference Mastercard Regression to Mastercard Actual Rate
12/20/2017	1.1845	1.184982	1.189919	0.04%	0.46%	1.1892	1.1880	0.36%	-0.16%
12/19/2017	1.1823	1.183482	1.182979	0.10%	0.06%	1.1871	1.1858	0.30%	0.24%
12/18/2017	1.1795	1.181282	1.183209	0.15%	0.31%	1.1843	1.1829	0.26%	-0.02%
12/15/2017	1.1806	1.186381	1.181047	0.49%	0.04%	1.1854	1.1841	0.08%	0.26%
12/14/2017	1.1845	1.183282	1.185744	-0.10%	0.11%	1.1892	1.1880	0.50%	0.19%
12/13/2017	1.1736	1.179382	1.177079	0.49%	0.30%	1.1786	1.1769	-0.07%	-0.01%
12/12/2017	1.1766	1.181282	1.179052	0.40%	0.21%	1.1815	1.1800	0.02%	0.08%
12/11/2017	1.1796	1.177882	1.181034	-0.15%	0.12%	1.1844	1.1830	0.56%	0.17%
12/8/2017	1.1742	1.181482	1.177492	0.52%	0.28%	1.1792	1.1776	-0.20%	0.01%
12/7/2017	1.1786	1.243576	1.180783	5.51%	0.19%	1.1835	1.1820	-4.83%	0.11%
12/6/2017	1.1817	1.187781	1.184532	0.51%	0.24%	1.1865	1.1852	-0.11%	0.06%
12/5/2017	1.1847	1.189081	1.187631	0.37%	0.25%	1.1894	1.1882	0.03%	0.05%
12/4/2017	1.1865	1.194081	1.187679	0.64%	0.10%	1.1912	1.1901	-0.24%	0.20%
12/1/2017	1.1885	1.193281	1.193867	0.40%	0.45%	1.1931	1.1921	-0.01%	-0.15%
11/30/2017	1.1849	1.188381	1.192736	0.29%	0.66%	1.1896	1.1884	0.10%	-0.36%
11/29/2017	1.1827	1.192081	1.188039	0.79%	0.45%	1.1875	1.1862	-0.39%	-0.15%
11/28/2017	1.1888	NA	1.191818	NA	0.25%	1.1934	1.1924	NA	0.05%
11/27/2017	1.1952	1.394481	1.195837	-0.06%	0.05%	1.1997	1.1989	0.44%	0.26%
11/24/2017	1.1877	1.185681	1.1944	-0.17%	0.56%	1.1924	1.1913	0.56%	-0.26%
11/23/2017	1.1848	1.182782	1.185438	-0.17%	0.05%	1.1895	1.1883	0.57%	0.24%
11/22/2017	1.1749	1.175882	1.175508	0.08%	0.39%	1.1799	1.1783	0.34%	-0.11%
11/21/2017	1.1718	1.180982	1.175646	0.78%	0.33%	1.1768	1.1751	-0.35%	-0.05%
11/20/2017	1.1781	1.182282	1.180587	0.35%	0.21%	1.1830	1.1815	0.06%	0.08%
11/17/2017	1.1795	1.180182	1.181879	0.06%	0.20%	1.1843	1.1829	0.35%	0.09%
11/16/2017	1.1771	1.186081	1.179967	0.76%	0.24%	1.1820	1.1805	-0.34%	0.05%
11/15/2017	1.184	1.180582	1.185962	-0.29%	0.17%	1.1887	1.1875	0.69%	0.13%
11/14/2017	1.1745	1.167583	1.176895	-0.59%	0.20%	1.1795	1.1779	1.02%	0.08%
11/13/2017	1.1656	1.167883	1.167233	0.20%	0.15%	1.1708	1.1688	0.25%	0.13%
11/10/2017	1.1634	1.165583	1.167607	0.02%	0.19%	1.1706	1.1686	0.43%	0.08%
11/9/2017	1.163	1.161184	1.165065	-0.16%	0.18%	1.1682	1.1662	0.61%	0.09%
11/8/2017	1.159	1.161684	1.161022	0.23%	0.17%	1.1643	1.1621	0.23%	0.09%
11/7/2017	1.1562	1.162484	1.161386	0.54%	0.45%	1.1616	1.1592	-0.08%	-0.19%
11/6/2017	1.159	1.169183	1.162292	0.88%	0.28%	1.1643	1.1621	-0.42%	-0.02%
11/3/2017	1.1657	1.168783	1.168827	0.26%	0.27%	1.1709	1.1689	0.18%	0.01%
11/2/2017	1.1645	1.165783	1.16848	0.11%	0.34%	1.1697	1.1677	0.34%	-0.07%
11/1/2017	1.1612	1.166183	1.165475	0.43%	0.37%	1.1665	1.1643	0.02%	-0.10%
10/31/2017	1.1638	1.165883	1.166047	0.18%	0.19%	1.1690	1.1670	0.27%	0.08%
10/30/2017	1.1612	1.165883	1.164035	0.40%	0.24%	1.1665	1.1643	0.05%	0.02%
10/27/2017	1.1605	1.183782	1.165618	2.01%	0.44%	1.1658	1.1636	-1.52%	-0.17%
10/26/2017	1.1753	1.181882	1.183234	0.56%	0.68%	1.1802	1.1787	-0.14%	-0.39%
10/25/2017	1.1785	1.179382	1.181636	0.07%	0.27%	1.1834	1.1819	0.34%	0.02%
10/24/2017	1.1761	1.177782	1.177699	0.14%	0.14%	1.1810	1.1795	0.28%	0.15%

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10/23/2017	1.174	1.185881	1.17757	1.01%	0.30%	1.1790	1.1773	-0.58%	-0.02%
10/20/2017	1.1818	1.185881	1.185512	0.35%	0.31%	1.1866	1.1853	0.06%	-0.02%
10/19/2017	1.1834	1.180582	1.185436	-0.24%	0.17%	1.1882	1.1869	0.64%	0.12%
10/18/2017	1.1749	1.180182	1.177972	0.45%	0.26%	1.1799	1.1783	-0.03%	0.02%
10/17/2017	1.1759	1.182582	1.179779	0.57%	0.33%	1.1808	1.1793	-0.15%	-0.04%
10/16/2017	1.1803	1.187581	1.181862	0.62%	0.13%	1.1851	1.1838	-0.21%	0.16%
10/13/2017	1.181	1.188081	1.187229	0.60%	0.53%	1.1858	1.1845	-0.19%	-0.23%
10/12/2017	1.1856	1.187081	1.187824	0.12%	0.19%	1.1903	1.1892	0.27%	0.11%
10/11/2017	1.183	1.182682	1.185675	-0.03%	0.23%	1.1878	1.1865	0.43%	0.07%
10/10/2017	1.1797	1.175682	1.1819	-0.34%	0.19%	1.1845	1.1831	0.75%	0.11%
10/9/2017	1.1746	NA	1.174785	NA	0.02%	1.1796	1.1780	NA	0.27%
10/6/2017	1.1707	1.177982	1.173663	0.62%	0.25%	1.1758	1.1740	-0.19%	0.03%
10/5/2017	1.1742	1.178882	1.177634	0.40%	0.29%	1.1792	1.1776	0.02%	-0.01%
10/4/2017	1.1767	1.177382	1.178643	-0.11%	0.00%	1.1836	1.1821	0.53%	0.30%
10/3/2017	1.1753	1.181782	1.17747	0.55%	0.16%	1.1802	1.1787	-0.13%	0.13%
10/2/2017	1.1744	1.183382	1.181374	0.76%	0.59%	1.1794	1.1778	-0.34%	-0.31%
9/29/2017	1.1806	1.180482	1.183081	-0.01%	0.21%	1.1854	1.1841	0.42%	0.08%
9/28/2017	1.1778	1.179582	1.180053	0.15%	0.19%	1.1827	1.1812	0.76%	0.10%
9/27/2017	1.1741	1.186281	1.179153	1.04%	0.43%	1.1791	1.1775	-0.61%	-0.14%
9/26/2017	1.1767	1.19618	1.1861	1.48%	0.63%	1.1836	1.1821	-1.05%	-0.33%
9/25/2017	1.1867	1.20048	1.193256	1.6%	0.55%	1.1914	1.1903	-0.76%	-0.25%
9/22/2017	1.1961	1.19548	1.200202	-0.05%	0.34%	1.2006	1.1998	0.43%	-0.03%
9/21/2017	1.1905	1.20338	1.19517	1.08%	0.39%	1.1951	1.1941	-0.69%	-0.09%
9/20/2017	1.2007	1.20078	1.201982	0.01%	0.11%	1.2051	1.2045	0.36%	0.21%
9/19/2017	1.1972	1.19708	1.200392	-0.01%	0.27%	1.2016	1.2010	0.38%	0.05%
9/18/2017	1.1948	1.19878	1.196634	0.33%	0.15%	1.1993	1.1985	0.04%	-0.16%
9/15/2017	1.1963	1.192281	1.198263	-0.34%	0.18%	1.2008	1.2000	0.71%	0.15%
9/14/2017	1.1885	1.19558	1.190654	0.93%	0.16%	1.1931	1.1921	-0.54%	0.12%
9/13/2017	1.1979	1.19788	1.198964	0.00%	0.09%	1.2023	1.2017	0.37%	0.23%
9/12/2017	1.1933	1.20408	1.197749	0.90%	0.37%	1.1978	1.1970	-0.52%	-0.06%
9/11/2017	1.1997	1.209379	1.202593	0.81%	0.24%	1.2041	1.2035	-0.44%	0.08%
9/8/2017	1.206	1.205979	1.209124	0.00%	0.26%	1.2102	1.2099	0.35%	0.06%
9/7/2017	1.1971	NA	1.205179	NA	0.67%	1.2015	1.2009	NA	-0.36%
9/6/2017	1.1931	1.194181	1.194784	0.09%	0.14%	1.1976	1.1968	0.29%	0.17%
9/5/2017	1.189	1.192381	1.193655	0.28%	0.39%	1.1936	1.1926	0.10%	-0.09%
9/4/2017	1.1905	1.19808	1.192058	0.64%	0.13%	1.1951	1.1941	-0.25%	0.17%
9/1/2017	1.192	1.191381	1.197643	-0.05%	0.47%	1.1966	1.1957	0.43%	-0.17%
8/31/2017	1.1825	1.19848	1.19045	1.35%	0.67%	1.1873	1.1860	-0.93%	-0.37%
8/30/2017	1.1916	1.207079	1.197954	1.30%	0.53%	1.1962	1.1953	-0.90%	-0.23%
8/29/2017	1.2048	1.19848	1.206617	-0.52%	0.15%	1.2091	1.2087	0.88%	0.17%
8/28/2017	1.1925	1.194281	1.1973	0.15%	0.40%	1.1970	1.1962	0.23%	-0.09%
8/25/2017	1.1808	1.182382	1.188125	0.13%	0.62%	1.1856	1.1843	0.27%	-0.32%



# Daily Comparison of Exchange rates EURO/USD (Aug 1, 2017 - Feb 21, 2018)

Date	ECB Spot Fix Rate	Visa	Mastercard	% Difference Visa to ECB Fix Spot Rate	% Difference Mastercard to ECB Fix Spot Rate	Regression Predicted Visa Rate	Regression Predicted Mastercard Rate	% Difference Visa Regression to Visa Actual Rate	% Difference Mastercard Regression to Mastercard Actual Rate
8/24/2017	1.1806	1.182482	1.1819	0.16%	0.11%	1.1854	1.1841	0.25%	0.18%
8/23/2017	1.1799	1.182582	1.1819	0.23%	0.17%	1.1847	1.1834	0.18%	0.12%
8/22/2017	1.1771	1.182882	1.182283	0.49%	0.44%	1.1820	1.1805	-0.07%	-0.15%
8/21/2017	1.1761	1.177482	1.181985	0.12%	0.50%	1.1810	1.1795	0.30%	-0.21%
8/18/2017	1.174	1.179082	1.177236	0.43%	0.28%	1.1790	1.1773	-0.01%	0.01%
8/17/2017	1.1697	1.177982	1.178585	0.71%	0.76%	1.1748	1.1730	-0.27%	-0.48%
8/16/2017	1.171	1.179382	1.175607	0.72%	0.39%	1.1760	1.1743	-0.28%	-0.11%
8/15/2017	1.1744	1.183982	1.179096	0.82%	0.40%	1.1794	1.1778	-0.39%	-0.11%
8/14/2017	1.1797	NA	1.183629	NA	0.33%	1.1845	1.1831	NA	-0.04%
8/11/2017	1.1765	1.178682	1.183059	0.19%	0.56%	1.1814	1.1799	0.23%	-0.27%
8/10/2017	1.1732	1.176582	1.176868	0.29%	0.31%	1.1782	1.1765	0.14%	-0.03%
8/9/2017	1.1731	1.182482	1.176227	0.80%	0.27%	1.1781	1.1764	-0.37%	0.02%
8/8/2017	1.1814	1.181482	1.182026	0.01%	0.05%	1.1862	1.1849	0.40%	0.24%
8/7/2017	1.1797	1.188981	1.1813	0.79%	0.14%	1.1845	1.1831	-0.37%	0.16%
8/4/2017	1.1868	1.189381	1.188899	0.22%	0.18%	1.1915	1.1904	0.18%	0.12%
8/3/2017	1.186	1.190981	1.189077	0.42%	0.26%	1.1907	1.1896	-0.02%	0.04%
8/2/2017	1.1829	1.184582	1.1871	0.15%	0.36%	1.1877	1.1864	0.25%	-0.06%
8/1/2017	1.1812	1.184682	1.184323	0.29%	0.26%	1.1860	1.1847	0.11%	0.03%